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NESTING HABITS OF TOCKUS MELANOLEUCUS, Licht.

By Dr. S. Schönland, Hon. M.A. Oxon, F.L.S.,
Director of the Albany Museum, Grahamstown.

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The nesting habits of the 'crowned hornbill' (*Tockus melanoleucus*) are so very extraordinary that they have repeatedly been noticed by various writers, but owing to the difficulties of finding the nests of this bird many details of the earlier accounts are not quite accurate, while others are not touched upon at all. As it has been my good fortune to have been able during the last few years to examine no less than seven nests together with the birds belonging to most of them, and as they appear to me to furnish a clue to the most important of the hitherto obscure points in the nesting habits of the crowned hornbill, I propose shortly to pass in review what is known to me about these curious habits. Nothing has, to my knowledge, been published on the nesting habits of any other South African hornbill. The bird I am dealing with is, in winter, often seen in large numbers in the gardens of Grahamstown, whereas in summer they are only to be met with in the country in close proximity to wooded kloofs. The reason for this slight migration will be very obvious, as we shall see presently that with us they nest in places where hollow trees are to be found. About five years ago Mr. C. Wilde, who was then taxidermist to the Albany Museum, discovered a nest in Driver's bush, about twenty-five miles south-east of Grahamstown. It was purchased by the Committee of the Albany Museum. In addition to the examination of the specimens which were brought to me, I made a careful examination on the spot of a nest found at Berkhleys, Lower Albany, before it was removed,

and gleaned some further information from the discoverers of the various nests.

The main point in which all observers * agree is this, that during incubation the female is a prisoner in a kind of cage, the entrance to which is closed to such an extent that it has to be broken open before the female can leave the nest. In all cases with which I have become acquainted the birds selected a hollow tree to make the nest in. Mrs. Barber says that they may also make the nest "between the crowded stems of the tall *Euphorbia*." However, I cannot reconcile this statement with the succeeding sentences in Mrs. Barber's account, to which I shall refer again presently. In the country of the Hereros, Pechuel—Lösche found a nest in a small cleft of a rock which had also been closed up to form a kind of cage. In our neighbourhood the birds do not seem to be very particular about the kind of tree they choose as long as it is suitable for their purposes. I have seen four nests made in the stem of *Euphorbia grandidens*, one in the stem of *Sideroxylon inerme*, one in the stem of *Schotia speciosa*, and one in the stem of another kind of tree which I could not identify. The essential points in guiding the birds in their selection seem to be only whether the hollow part of the stem is sufficiently large for the female to move about in the nest, and whether it has one or more comfortable entrances, which lastly must be of such a nature that they can be partially or completely closed up. The female, when once inside the nest, is fed by the male either through a narrow slit left in the material with which the entrance has been closed or through a natural cleft in the wood. In the latter case the main entrance is closed up completely. Mrs. Barber also states "that while the process of incubation is going on, the male bird builds the female into the nest, closing up the entrance in such a manner that it is impossible for her to escape, leaving only a small hole for the purpose of feeding her during her long imprisonment." "This peculiar habit may be a precautionary measure to protect the female during the season of incubation; for it may be that during that time she is too weak and dull to fly away from any approaching danger." It will be seen at once that these statements can scarcely be reconciled to Mrs. Barber's previously mentioned statement that the nest is sometimes formed between the crowded stems of the tall *Euphorbia*. I have further to question the statement that the male builds the female in. Livingstone was told so by a native, but I have not come across any evidence that this is

* See Mrs. Barber's account in 'The Birds of South Africa,' by E. L. Layard, new edition by R. B. Sharpe, p. 128; also Livingstone's, Kirk's, and Anderson's observations in 'Brehm's Tierleben,' Neue Ausgabe, 1891, vol. v. p. 13.

correct. On the contrary, I have evidence to show that at all events the female takes an essential part in the plastering up of the entrance.

The nests which I have seen may be conveniently divided into two types. The majority of them were formed in the hollow of a tree which was naturally closed above and below, a hole on one side leading into it through which the female could enter (page 5, fig. A). This hole is plastered up by a kind of cement, in which legs of beetles, grasshoppers, hard wings of insects, broken bits of shell, bits of wood, &c., are recognisable. There is, however, always a narrow slit left (about $\frac{1}{2}$ inch wide and 4–6 inches long) through which the male feeds the female. One of the nests (page 5, fig. B) received last year had two such holes, both of which were plastered up partially in the same fashion. The second type of nest (page 5, fig. C) was found in two perpendicular hollow stems of *Euphorbia grandidens*, which resembled big chimneys and had no large hole at the sides. One of these was examined by myself before it was removed.

The stem showed several cracks, one of which was utilised by the birds in the same manner as the slit in the cement found in the first type. The female had to go into the stem from above, a distance of about 10 feet, before it reached this crack. Just below this crack a platform had been constructed on which she could lay her eggs and incubate. It was only a few inches thick, but seemed to answer its purpose exceedingly well. I do not know how it was constructed, as I did not remove it, but it was evidently made by the birds themselves. About 3 feet above the crack a ceiling had been put in by the birds, consisting of pieces of the stem of an aloe glued to the sides of the stem and covered with bits of wood, moss, &c. This ceiling appeared to be perfectly watertight, as it had been raining hard just previous to my visit to the nest, and yet the latter was perfectly dry inside. The finished nest of this second type is almost exactly like the first—namely, it forms a cage with a narrow opening, but it will be admitted that its construction requires an amount of sagacity on the part of our bird which is almost unparalleled.

The female shortly after entering the nest begins to moult. Sometimes she goes through the moulting process so vigorously that at one stage she is almost naked, while in other cases she does not lose the majority of her old feathers until after she has left the nest. The female is, especially when she has lost many of her old feathers before the new ones have appeared, unable to fly, but otherwise she is by no means helpless and weak. She is usually very fat while she is in her prison, as the male bird brings her food every few minutes. As a rule when any danger approaches

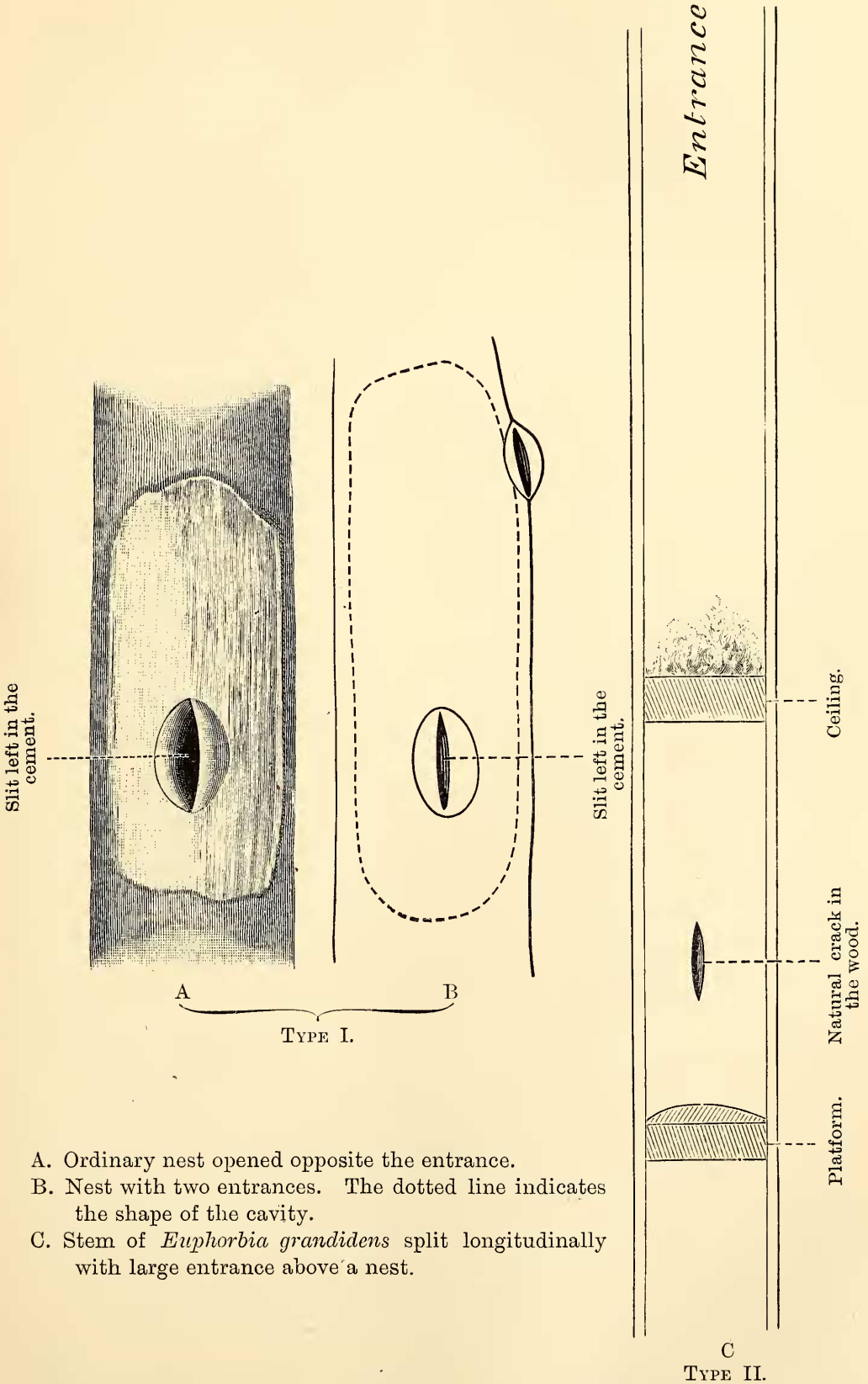
the nest, the female climbs up in the nest as far away as possible from the entrance, and there she keeps perfectly quiet until the danger is passed. I have noticed the same behaviour in the young ones. The imprisoned birds, therefore, in the first place rely for protection on the fact that the nest is not easily recognised as such, but I have noticed that the birds can give a good account of themselves with their strong beaks when actually attacked.

I may mention that if the hollow of the tree passes a long distance below the slit through which the food is passed, it is either filled up with soil, bits of wood, &c., or, as stated before, a platform is put in. The result aimed at is always the same—namely, the female must always, when sitting, be able to reach the slit with her beak. This, no doubt, facilitates the feeding process, and besides, it enables her to deal a surprise blow to any snake or small mammal which might try to force its way into the nest.

The time during which the female is imprisoned I estimate at about seven to eight weeks. It is certainly not less than six weeks. The eggs are laid near Grahamstown at the end of December or beginning of January. There are usually three, but in one case four young birds were found in one nest, so that evidently the number varies. The eggs are pure white.

The question naturally arises as to who closes the nest. Is it done by the male or by the female, or have they both a share in it? Further, What is the material with which the nest is closed up in the ordinary cases? For a long time I held with Livingstone and Mrs. Barber that the male imprisons the female, and unfortunately even now I cannot decide this question from direct observation of the building operations. But when I handed the female belonging to the first nest I received this year to our present taxidermist, Mr. M. Irniger, he called my attention to the fact that her beak was smeared pretty well all over with the same cement which was used to close up the entrance in the nests belonging to type No. 1, and to fasten the pieces of aloe stems to the walls of the nest belonging to type No. 2, in order to form the lower portion of the ceiling as described before. It was evident, therefore, that the female had access to this cement, whatever its nature and origin might be.

As all the nests which had come under my observation were remarkably clean, and as sweet smelling as a bird's nest can possibly be, I had often thought that the female might use her own excrements as a cement, but as the latter was so very unlike ordinary excrements of birds, I had not given serious attention to this supposition, and believed what I had been told by some people, that she throws her excrements with some violence through the slit which



A. Ordinary nest opened opposite the entrance.
B. Nest with two entrances. The dotted line indicates the shape of the cavity.
C. Stem of *Euphorbia grandidens* split longitudinally with large entrance above a nest.

DIAGRAMMATIC REPRESENTATION OF THREE NESTS OF *Tockus melanoleucus*, Licht.

remains open, although I could not imagine how she managed it. But as the female to which I referred had her beak covered with it, some of her excrements were taken out of her anus for comparison. They looked very different from any other excrements of birds I have seen. They felt sticky to the touch, and when dry they presented exactly the same appearance as the cement with which I am very familiar, except, of course, that there were no bits of wood embedded in it. I feel now almost convinced that the female constructs her own prison, and I begin to doubt whether the male bird has any essential share in it. However, as only the lowest portion of the ceiling in the nest belonging to type No. 2 could have been constructed by the female, the upper loose portions must evidently have been put in by the male, and it must therefore be left to further observations to decide whether he also uses his excrements in the same manner as the female does, since this case shows, at all events, that he must take some interest in the construction of the nest.

There is not very much room in a nest when the female is alone, and one can easily imagine that it would be a very tight fit if she was to occupy it with three or four nearly full-grown young ones; besides, the supply of food for three or four such large birds might even overtax the strength of the most devoted father of such a family. The question therefore arises, Does the female leave the nest before the young ones are quite capable of taking care of themselves? and if she does so we have further to ask whether the nest is closed up again, and by whom this is done? The only nest which arrived late in the season last year was the one found in the Kap River Valley, near Clumber. It was brought to me about the 10th of February by Mr. W. Webb. Unfortunately he had removed the cement to prevent it from being broken on the journey, but he was positive that no bird had escaped from it, as he had carefully closed up the entrance again. When opened, the nest was found to contain a nearly full-grown young bird. As Mr. Webb is known to be a trustworthy man, I had no hesitation in concluding from his statements that the female left the nest some time before the young one was fully developed and helped the male to feed it, and that the entrance was closed up after her exit in the usual manner, most probably by the young bird. This conclusion was strikingly confirmed by a nest which I received this year on January 19th. It was perfectly intact; no bird could possibly have left it on the journey to Grahamstown, but when it was opened it was found to contain only two young birds which were still far from the stage at which they would be able to fly. The female had left the nest, but the entrance was plastered up again in the ordinary fashion. Thus

it is proved that the nest may be perfectly closed and yet two birds may be seen flying to the nest—namely, the male and the female—and this may explain the statements which I have had from trustworthy observers that they have actually noticed two birds flying to the same nest, and which were supposed by some to be two males. There is still plenty of scope for further investigations on the nesting habits of the hornbill, but I hope the short account of it which I have given may prove not to be without interest.